HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS

RSO-50E Ion Chamber Survey Meter

User's Manual

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FOREWORD

This manual provides the basic installation, operation, and maintenance procedures for the Bicron RSO-50E Ion Chamber Survey Meter.

Section 1.0 Introduction provides a general description of the instrument and its operation, and a detailed listing of its physical and performance specifications.

Section 2.0 Battery describes the procedure for installing and testing the batteries.

Section 3.0 Collection Potential Test describes the procedure for testing the electric potential available to the Ion Chamber.

4.0 Radiation Measurements describes the normal operating procedures for the instrument.

Section 5.0 Calibration provides directions for calibration of the instrument.

Section 6.0 Description provides a brief technical description of the instrument.

Section 7.0 Correction Factors describes the provisions for compensation for altitude and temperature.

The **Appendices** are: A) QC Acceptance Procedure, which includes a detailed calibration procedure; B) a complete spare parts list so that a technician can repair the instrument on-site; and C) schematic and pictorial diagrams to facilitate repair procedures.

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TABLE OF CONTENTS

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PROCEDURES and CAUTIONS

The equipment herein described is designed and manufactured in compliance with all applicable safety standards. Nevertheless, certain hazards are inherent in the use of electronic and radiometric equipment.

Adequate warnings are included in this manual and on the product itself to cover hazards that may be encountered in normal use and servicing of this equipment. No other procedures are warranted by Bicron.

It shall be the owner's or user's responsibility to ensure that the procedures and cautionary notes are heeded.

Failure on the part of the user in any way to follow the prescribed procedures shall absolve Bicron and its agents from any resulting liability.

This instrument is intended solely for the detection and measurement of ionizing radiation. It should be used only by persons who have been trained in the proper interpretation of its readings and the appropriate safety procedures that should be followed in the presence of radiation.

All instructions and warnings contained in this manual or on the instrument must be read before use and must be strictly followed. Failure to follow these instructions and warnings may result in inaccurate readings and/or user hazard.

Indicated battery and other operations tests must be performed prior to each use to assure that the instrument is functioning properly.

CAUTION

FAILURE TO CONDUCT PERIODIC PERFORMANCE TESTS IN ACCORDANCE WITH ANSI N323-1978, PARAGRAPHS 4.6 AND 5.4, AND TO KEEP RECORDS THEREOF IN ACCORDANCE WITH PARAGRAPH 4.5 OF THE SAME STANDARD, COULD RESULT IN ERRONEOUS READING OF POTENTIAL DANGER. ANSI N323-1978 BECOMES, BY THIS REFERENCE, A PART OF THIS OPERATING PROCEDURE.

INSPECTION

Instruments should be examined and tested as soon as received. Claims for transportation damages, if any, should be filed at once with the delivery carrier.

1.0 Introduction

1.1 General Description

The Bicron RSO-50E® model is a portable, convenient survey meter embodying state-of-the-art electronics and rugged construction.

The instrument features an ion chamber detector with a unique, non-magnetic, solid-state switch design. This concept allows for 0 - 50 R/h (roentgen per hour) rate coverage over five linear ranges using a single feedback element.

Both the 9-volt battery and the collection potential cells are monitored at the same time when the control switch is in the "bat." position. This prevents confusion over which batteries are being monitored.

This meter also features an easy-to-read, wide-view meter, beta and gamma detection capability, and an easily maintained desiccant system.

1.2 Specifications

Radiation Detected: Beta, gamma, and X-ray.

Detector: Air-filled ionization chamber, vented to the atmosphere through silica gel desiccant.

Range: 0 - 50 roentgens per hour in five linear ranges.

Linearity: Within ± 5% of full scale.

Energy Response: ± 20% from 12 keV to 7 MeV. (See Figure 2.)

Temperature: Operational from -40 to +50 °C.

Compensation: The unit is compensated for accuracy within ± 10%, ± 0.5 mR/h (milliroentgen per hour) over the operational temperature range.

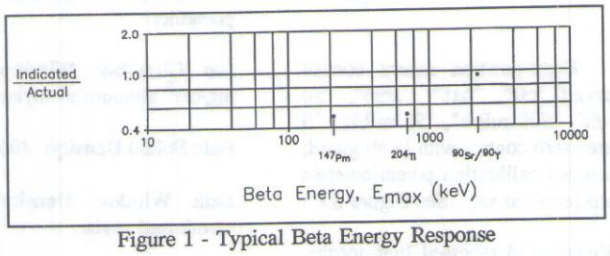

Figure 1 - Typical Beta Energy Response

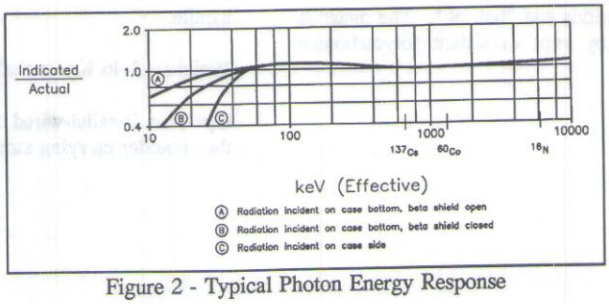

Figure 2 - Typical Photon Energy Response

1.0 Introduction (cont'd)
1.2 Specifications (cont'd)

Humidity: Less than ± 5% change in reading from 10 - 95% relative humidity, non-condensing.

Warmup time: None.

Response Time: Approximately 5 seconds, 0 - 90% of final reading, on 0 - 5, 0 - 50, 0 - 500 mR/h ranges. Less than 2 seconds, 0 - 90% of final reading, on 0 - 5, 0 - 50 R/h ranges.

RF Sensitivity: Unaffected by radar fields up to 20 mW/cm^2.

Battery Complement: One nine-volt (MN1604 or equivalent). Optionally, two with parallel-wired option.

Battery Life: Greater than 100 hours. (Greater than 200 hours with parallel option.)

Controls: Eight-position rotary control switch marked "off", "bat.", "zero", "50 R/h", "5 R/h", "500 mR/h", "50 mR/h", "5 mR/h"; meter zero control with knob guard; and top-mounted calibration potentiometers under splash-proof cover. (See Figure 3.)

Display: Ruggedized, recessed, high-torque, 1-mA meter with 8.5 cm scale marked 0 - 5 in 50 divisions and "bat. ok". The meter is protected by impact-resistant polycarbonate window.

Collection Potential: 30 volts, provided by ten permanently installed energy cells. (Life expectancy approximately 5 years.)

Geotropism: Within ± 2% of full scale.

Shock: 100g per lightweight machine, per MIL-STD 202C, method 202B.

Vibration: 5g in each of three mutually orthogonal axes at one or more frequencies from 10 - 33 Hz.

Construction: Splash-proof, shockproof, two pieces, all metal case. Scratch-resistant, laminated control panel and Bicron Kleen-Krome^R trim on case top; durable black polyurethane paint used on handle and case bottom; chrome plated steel clips for optional shoulder strap.

Detector Volume: Approximately 200 cm^3.

Ion Chamber Wall Density: 200 mg/cm^2 phenolic.

Ion Chamber Window Density: 3.5 mg/cm^2 aluminized mylar.

Beta Shield Density: 400 mg/cm^2 phenolic.

Beta Window Density: 3.5 mg/cm^2 aluminized mylar.

Size: 10.8 X 20.4 X 20.4 cm, including handle.

Weight: 1.46 Kg, including one battery.

Options: Parallel-wired battery board; over-the-shoulder carrying strap, lighted meter.

1.0 Introduction (cont'd)
1.2 Specifications (cont'd)

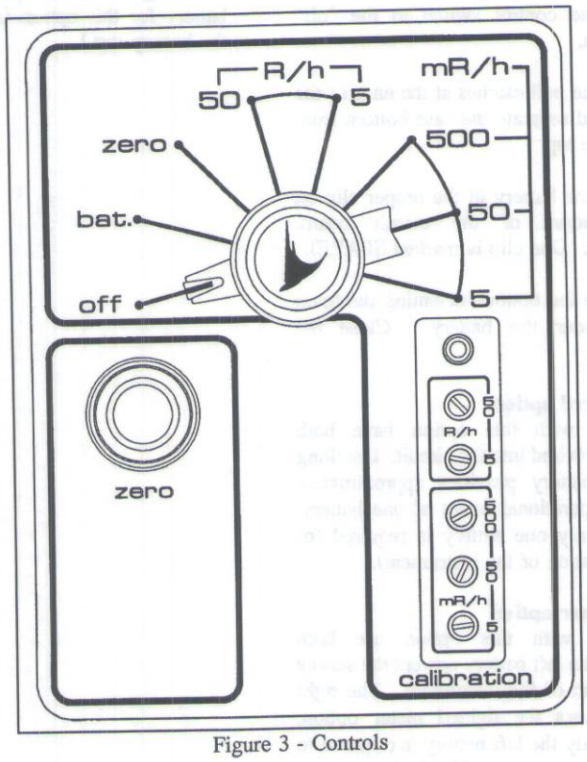

Figure 3 - Controls

2.0 Battery

Battery Type: 9V Mallory MN1604 or equivalent.

2.1 Battery Installation

Procedure:

1. Turn the control switch to the "off" position.
2. Open the pull catches at the ends of the case and separate the case bottom from the case top.
3. Install the battery in the proper clip on the bottom of the circuit board. (NOTE: One clip is marked SPARE).
4. Replace the bottom, orienting the foam pad under the battery. Close the catches.

Parallel-wired option

Instruments with this option have both battery clips wired into the circuit. Installing a second battery provides approximately twice the operational hours of one battery. (NOTE: Only one battery is required for proper operation of the instrument).

Lighted meter option

Instruments with this option use both batteries. The left battery powers the survey meter portion of the instrument. The right battery powers the lighted meter option. (NOTE: Only the left battery is required to power the instrument. If this is the only battery installed in the unit, the meter will operate, but the meter light will be inoperable).

Note that one instrument cannot be equipped with both options at the same time.

2.2 Battery Test

Turn the control switch to the "bat." position. A meter reading within the "bat. ok" checkband should be observed. If the meter reading is below the "bat. ok" checkband, replace the 9V battery. (NOTE: If the lighted meter option is installed, the battery for this option is not tested during the battery test.)

3.0 Collection Potential Test

The Ion Chamber collection potential is checked when the Control Switch is in the "bat." position. The meter needle will oscillate in an obvious manner, and will not come to rest in the "bat. ok" range if the proper collection potential is not being supplied to the Ion Chamber. (NOTE: This test is valid regardless of the condition of the 9V main battery).

The Collection Potential Cells do not normally require replacement or maintenance because of the relatively insignificant drain imposed by the ion chamber circuitry.

4.0 Radiation Measurements

To make a radiation measurement:

1. Turn the control switch to the "zero" position, and zero the meter using the zero potentiometer on the case top.

2. Turn the control switch to one of the five linear ranges. Due to the sensitivity of the ion chamber to transient switching noise, the meter will momentarily deflect when the 5 mR/h range is selected.

3. When surveying for medium to high-energy gammas or X-rays, slide the positive-lock beta shield closed to protect the mylar window. Radiation incident on the front, side, and bottom of the case will be detected.

4. When surveying for betas or low-energy gammas or X-rays, slide the beta shield open and orient the instrument so that radiation is incident on the exposed window. Radiation incident on the bottom of the case (through the mylar window) will be detected at highest efficiency.

CAUTION

An external source of ionizing radiation, of a type the instrument was designed to measure, must be used to determine proper operation of this instrument.

5.0 Calibration

The instrument is normally calibrated with ^{137}Cs gamma rays. Recalibration is required after servicing, and at regular intervals specified by appropriate regulatory agencies.

During calibration, the unit is placed in a known radiation field in a fixed geometry. The center of the ion chamber is indicated by markings on the case bottom to aid in achieving correct orientation.

The calibration controls are located under a splash-proof cover on the top panel. To gain access to these controls, loosen the thumbscrew and remove the door. The controls themselves are splash-proof, even when the cover is removed.

A detailed calibration procedure is included in this manual as Appendix A.

6.0 Description

6.1 Ionization Chamber

The ion chamber assembly used in the RSO-50E is built around a low density cylindrical shell. One end is sealed with an aluminized mylar window; the other is mounted directly to the electronic amplifier housing. The inside of the cylinder is conductive, and carries the negative collection potential. A collection plate is suspended within the cylinder. The chamber is air-filled, and is vented to the atmosphere through silica gel desiccant.

This assembly is mounted to the chamber-mounting printed circuit board, and is oriented so that the ion chamber window is aligned with the aluminized mylar window in the case bottom.

The total density of the two mylar windows is 7 mg/cm^2. Both windows are designed to be easily replaced by the user in the event of accidental damage.

6.0 Description (cont'd)

6.2 Ion Chamber Amplifier

This section of the unit amplifies the small currents generated in the ion chamber shell, and also provides a signal to drive the meter on the case top.

In addition, patented non-magnetic solid-state switching covers a five-decade range with only one feedback resistor.

NOTE: Due to its sensitivity, this section of the instrument is highly susceptible to damage from electrostatic discharge. This includes contact with the collection plate inside the ion chamber shell. Precautions against electrostatic discharge should be taken whenever service is performed in this area.

6.3 Control Circuitry

Circuitry that controls and monitors the actions of the Ion Chamber Assembly is located on both the Switch and Chamber-mounting Printed Circuit Board Assemblies.

All range selection, calibration, and meter control circuitry are located on the Switch Printed Circuit Board Assembly. The Collection Potential Test and Power Supply Circuitry (in addition to the Ion Chamber Assembly) are located on the Chamber Mounting Printed Circuit Board Assembly.

6.4 Ion Chamber Desiccant System

The air-filled ionization chamber is vented to the atmosphere. Due to the high sensitivity of the electronic amplifier, leakage currents can occur in the presence of moisture inside the amplifier shell. To minimize this moisture, the ion chamber amplifier is vented to a desiccant system.

The desiccant used is an indicating type of silica gel. Dry silica gel will be dark blue in color. As the silica gel absorbs moisture, it will turn to a light pink color. At the first sign of pink discoloration, remove the silica gel from the holder. Dry the "wet" crystals at 200°F for 24 hours, and return them to the holder.

If the desiccant is allowed to become saturated, leakage currents may develop inside the amplifier shell, which may result in erroneous readings on the meter. If this occurs, it will be necessary to "dry out" the entire ion chamber assembly. This is accomplished by heating the instrument to 140°F for several hours to bake out the moisture. (NOTE: This is required only in extreme saturation conditions, which rarely occur).

The design of the desiccant system allows for easy replacement of the crystals. Access to the silica gel is gained through a snap-off/snap-on cap at the end of the holder. This holder is held in place by two metal clips that are mounted to the battery-printed circuit board assembly. The holder is connected to the ion chamber assembly via a small, flexible tube, which can be removed from either end to ease in servicing the desiccant system.

7.0 Correction Factors

Since the Ion Chamber is vented to the atmosphere, corrections must be made to account for changes in both temperature and atmospheric pressure.

The instrument is designed to electronically compensate for temperature over its operational range.

Pressure changes due to altitude are not electronically compensated, and require the use of a correction factor. The correction factor relates the altitude at which the instrument was calibrated to the altitude at which it is operated. If it is used at the same altitude at which it is calibrated, the correction factor is 1.0. The correction factor increases with the difference between calibration and operating altitudes, becoming quite significant at the extremes.

The correction factors are listed in Table 1. The meter reading should be multiplied by the appropriate correction factor to get the true value.

The Certificate of Calibration that accompanies this instrument notes the altitude at which the unit was calibrated.

Table 1
Correction Factors for Altitude (Pressure)

Oper. Alt.	Calibration Altitude 0	1000	2000	3000	4000	5000	6000	7000	800
0	1.00	0.96	0.93	0.90	0.86	0.83	0.80	0.76	0.73
1000	1.04	1.00	0.96	0.93	0.90	0.86	0.83	0.80	0.76
2000	1.08	1.04	1.00	0.96	0.93	0.90	0.86	0.83	0.80
3000	1.12	1.08	1.04	1.00	0.96	0.93	0.90	0.86	0.83
4000	1.16	1.12	1.08	1.04	1.00	0.96	0.93	0.90	0.86
5000	1.20	1.16	1.12	1.08	1.04	1.00	0.96	0.93	0.90
6000	1.25	1.20	1.16	1.12	1.08	1.04	1.00	0.96	0.93
7000	1.30	1.25	1.20	1.16	1.12	1.08	1.04	1.00	0.96
8000	1.35	1.30	1.25	1.20	1.16	1.12	1.08	1.04	1.00

Meter Reading X Correction Factor = True (Corrected) Reading

Appendix A

BICRON QC ACCEPTANCE PROCEDURE Number 1108931
MODEL: RSO-50E Ion Chamber Survey Meter

1. Perform visual inspection of finished product.

2. Make sure the control switch is in the "off" position. Remove all 9-volt batteries. Perform the following tests:

   A. Mechanically zero the meter via the rear zero adjustment screw located on the meter barrel.

   B. Measure the voltage of each energy cell (BT1 through BT10) on the chamber mounting board assembly. A minimum voltage of 2.70 volts should be observed on each cell.

   C. Disconnect the Ion Chamber Assembly from the Chamber Mounting Board Assembly. Connect a power source of 9.30 ± .05 volts across the main battery terminals of the Battery Board. Turn the Control Switch to the "bat." position. The meter should oscillate at a rate of about 1 to 5 Hertz. Turn the Control Switch to the "off" position. Reconnect the Ion Chamber Assembly to the Chamber Mounting Board Assembly. Turn the Control Switch to the "bat." position. The meter should indicate a "bat. ok" condition within ± 5% of full scale on the meter.

      NOTE: When removing or reconnecting the Ion Chamber Assembly, precautions against electrostatic discharge should be taken. The power source used should always be OFF when removing or reconnecting the Ion Chamber Assembly.

   D. Leave the Control Switch in the "bat." position. Connect a voltmeter between pin 1 (ground) and pin 24 (-V) of the 24-pin header. A voltage of -8.00 volts or greater (more negative) should be observed.

   E. Turn the Control Switch to the "zero" position. Turn the Zero Control Knob in a clockwise direction. An increase in the meter reading (towards full scale) should occur. Set the meter to zero with the Zero Control Knob.

   F. Turn the control switch to the "5 R/h" position. Adjust R13 (located on the side of the switch board assembly) until the meter reads zero. Turn the control switch to the "50 R/h" position. The meter should read zero.

3. Perform the following isotopic calibration:

   A. Remove Calibration cover on the case top.

   B. Turn the Control Switch to the "50 R/h" position. Position the unit so that the Ion Chamber is in the

Appendix A (cont'd)

appropriate fixed geometry in a known ^{137}Cs radiation field.

NOTE: Make sure that the *entire* chamber is being uniformly irradiated by the radiation field.

C. Expose the unit to the proper field intensity required to calibrate the unit at 80% of full scale. Refer to Table A1 for the proper radiation field intensity.

D. Adjust the 50 R/h potentiometer (R25) until the unit reads 80% of full scale on the meter.

E. To test circuit linearity, expose the unit to the proper field intensity required for a meter reading of 20% of full scale. Refer to Table A1 for the proper radiation field intensity.

F. Note these two readings on a Certificate of Calibration.

G. Repeat this procedure for the four remaining positions (5 R/h, 500 mR/h, 50 mR/h, and 5 mR/h), using the correspondingly labeled calibration potentiometers (also identified as R27, R5, R8, and R11, respectively, on the drawings).

4. Turn the control switch to the "off" position. Disconnect all test equipment. Install a new 9 volt alkaline battery (MN1604 or equivalent) in the main battery holder. (NOTE: If unit is equipped with either parallel-wired battery board or lighted meter option, install two batteries in the holders.)

5. If unit is equipped with lighted meter option, test for proper operation.

6. Complete, date, and sign a Certificate of Calibration.

Table A1
Isotopic Calibration Table for the RSO-50E

Meter Range	% Full Scale	Exposure Rate	Acceptable Reading
50 R/h	80%	40 R/h	38 - 42 R/h
50 R/h	20%	10 R/h	9 - 11 R/h
5 R/h	80%	4 R/h	3.8 - 4.2 R/h
5 R/h	20%	1 R/h	0.9 - 1.1 R/h
500 mR/h	80%	400 mR/h	380 - 420 mR/h
500 mR/h	20%	100 mR/h	90 - 110 mR/h
50 mR/h	80%	40 mR/h	38 - 42 mR/h
50 mR/h	20%	10 mR/h	9 - 11 mR/h
5 mR/h	80%	4 mR/h	3.8 - 4.2 mR/h
5 mR/h	20%	1 mR/h	0.9 - 1.1 mR/h

Appendix B

Spare Part List No. 1108901

Schematic Symbol	Description	Part No
	Switch PCB Assembly	9420067
C4,C11	Capacitor, 0.01 μF, film	9211031
C9	Capacitor, 0.22 μF, film	9212241
C10,C12	Capacitor, 0.001 μF, film	9211021
D1,D2	Diode, 1N4148	9600004
R13	Trimpot, 50K, side adjust	9395031
R14,R15	Resistor, 49.9K, 1/4W, 1%	8549924
R16,R17	Resistor, 2.7K, 1/4W, 5%	8127014
R18	Resistor, 1.5K, 1/4W, 5%	8115014
R19	Resistor, 8.45K, 1/4W, 1%	8584514
R23	Resistor, 200K, 1/4W, 1%	8520034
R28,R29	Resistor, 10K, 1/4W, 1%	8510024
R30	Resistor, 33.2K, 1/4W, 1%	8533224
RN1	Resistor Network, 7 X 220K	8822031
RT1	Thermistor, 1K @ 25° C	8810011
SW2	Switch, Rotary, 8 position	9560005
U3,U4,U6	Integrated Circuit, MC14016BCP	9650002
U5	Integrated Circuit, LF351N	9640008
U9,U10	Integrated Circuit, MC14075BCP	9650031
U11	Integrated Circuit, ICM7555CPA	9650030
U12	Integrated Circuit, MC14538BCP	9650004
	Header, 24 pin	9780002
	Chamber Mtg. PCB Assembly	9420066
BT1-BT10	Battery, 3V Lithium, BR1225	9750003
C5	Capacitor, .047 μF, film	9214731
C6	Capacitor, 1 μF, 35V, tantalum	9231051
C7,C8	Capacitor, 33 μF, 16V, tantalum	9233362
D3	Diode, Zener (28V), 1N5255B	9600006
D4,D5,D7	Diode, 1N4148	9600004
R20	Resistor, 10 meg, 1/4W, 5%	8110054
R21	Resistor, 22 meg, 1/4W, 5%	8122054
R22	Resistor, 1 meg, 1/4W, 5%	8110044
U7	Integrated Circuit, MC14093BCP	9650001
U8	Integrated Circuit, ICL7660CPA	9640005
	Connector, top entry, 24 pin	9780008
	Connector, top entry, 12 pin	9780067

Appendix B (cont'd)

Spare Part List No. 1108901

Schematic Symbol	Description	Part No
	Calibration PCB Assembly	9420068
R4,R9	Resistor, 23.7K, 1/4W, 1%	8523724
R5,R8,R25	Trimpot, 50K, top adjust	9395032
R6	Resistor, 33.2K, 1/4W, 1%	8533224
R7	Resistor, 750K, 1/4W, 1%	8575034
R10	Resistor, 1M, 1/4W, 1%	8510044
R11	Trimpot, 5K, top adjust	9395023
R12	Resistor, 3.01K, 1/4W, 1%	8530114
R24	Resistor, 20K, 1/4W, 1%	8520024
R26	Resistor, 200K, 1/4W, 1%	8520034
R27	Trimpot, 500K, top adjust	9395042
	Header, 12 pin	9780006
	Battery PCB Assembly	9420072
	(with Lighted Meter Option 9420077)	
	(with Parallel-wired Option, 9420002)	
	Ion Chamber Assembly	1108060
	Vent Tube	9100057
	Chamber Shell with window	9100493
	Ion Chamber PCB Assembly	9420073
	Angle Bracket	9850026
	Case Top Assembly	1108140
	(with Lighted Meter Option 1108141)	
	Zero Knob Guard	9100034
	Desiccant Holder	9100056
	Calibration Pot Door with Chain	9100059
R3	Potentiometer, 2.5K	9382511
	Meter Window	9400011
	Meter	9400022
	Handle	9710007
	(with Lighted Meter Option 9100158)	
	Knob, Function	9770003
	Knob, Zero	9770004
	Meter Support Bracket	9850002
	Lighted Meter PCB Assembly	9420074
	(required for Lighted Meter Option only)	

Appendix B (cont'd)

Spare Part List No. 1108901

Schematic Symbol	Description	Part No
	Miscellaneous	
BT11,BT12	Battery, 9V alkaline, MN1604	9750001
	Manual, Operator's	1108901
	Spare Parts List	1108911
	Schematic Circuit Diagram	1108921
	QC Acceptance Procedure	1108931

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Appendix C

The drawings listed below follow this page.

9700188	Switch Board Subassembly
9700189	Chamber Mounting Board Subassembly
9700190	Ion Chamber Board Subassembly
9700191	Calibration Potentiometer Board Subassembly
1108921	Schematic Circuit Diagram

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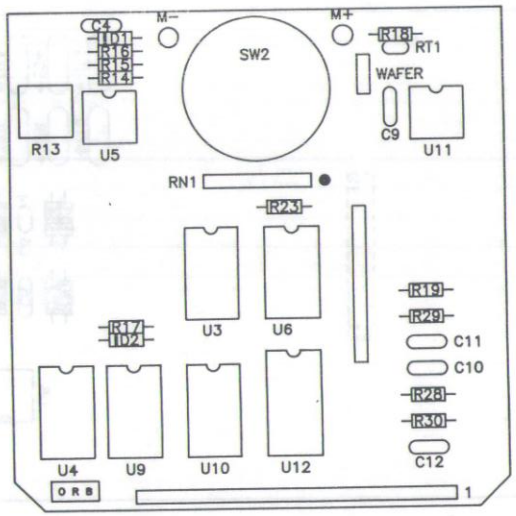

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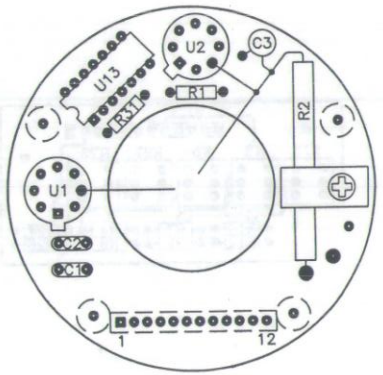
HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS
NEWBURY, OHIO U.S.A.

Part Location Drawing
Switch Board Subassembly

DWG. SIZE	BASIC PART NUMBER	REV.
A	9700188	A



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HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS
NEWBURY, OHIO U.S.A.

Component Location Drawing
Ion Chamber Board Subass'y

DWG. SIZE	BASIC PART NUMBER	REV.
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REV.	DATE	DESCRIPTION	BY
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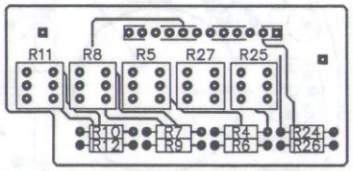

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TOLERANCES UNLESS OTHERWISE SPECIFIED	SCALE: FULL
FRAC.:	DRAWN: JAR
.X:	DATE: 2-16-93
.XX: NONE	CHECKED:
.XXX:	DATE: 2-16-93
ANGLES:	
MICRO FIN.: √	
DE-BURR AND BREAK ALL EDGES	DO NOT SCALE PRINT

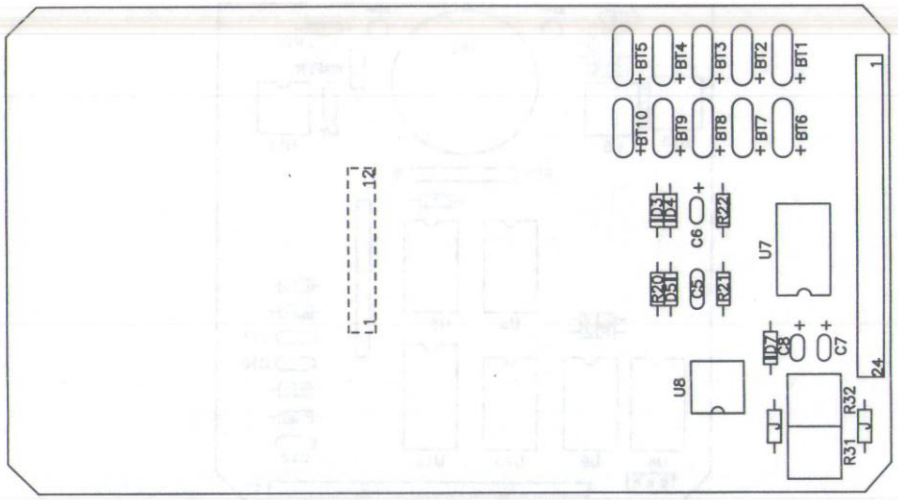
HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS

NEWBURY, OHIO U.S.A.

Part Location Drawing

Cal Pot Board Subassembly

DWG. SIZE	BASIC PART NUMBER	REV.
A	9700191	



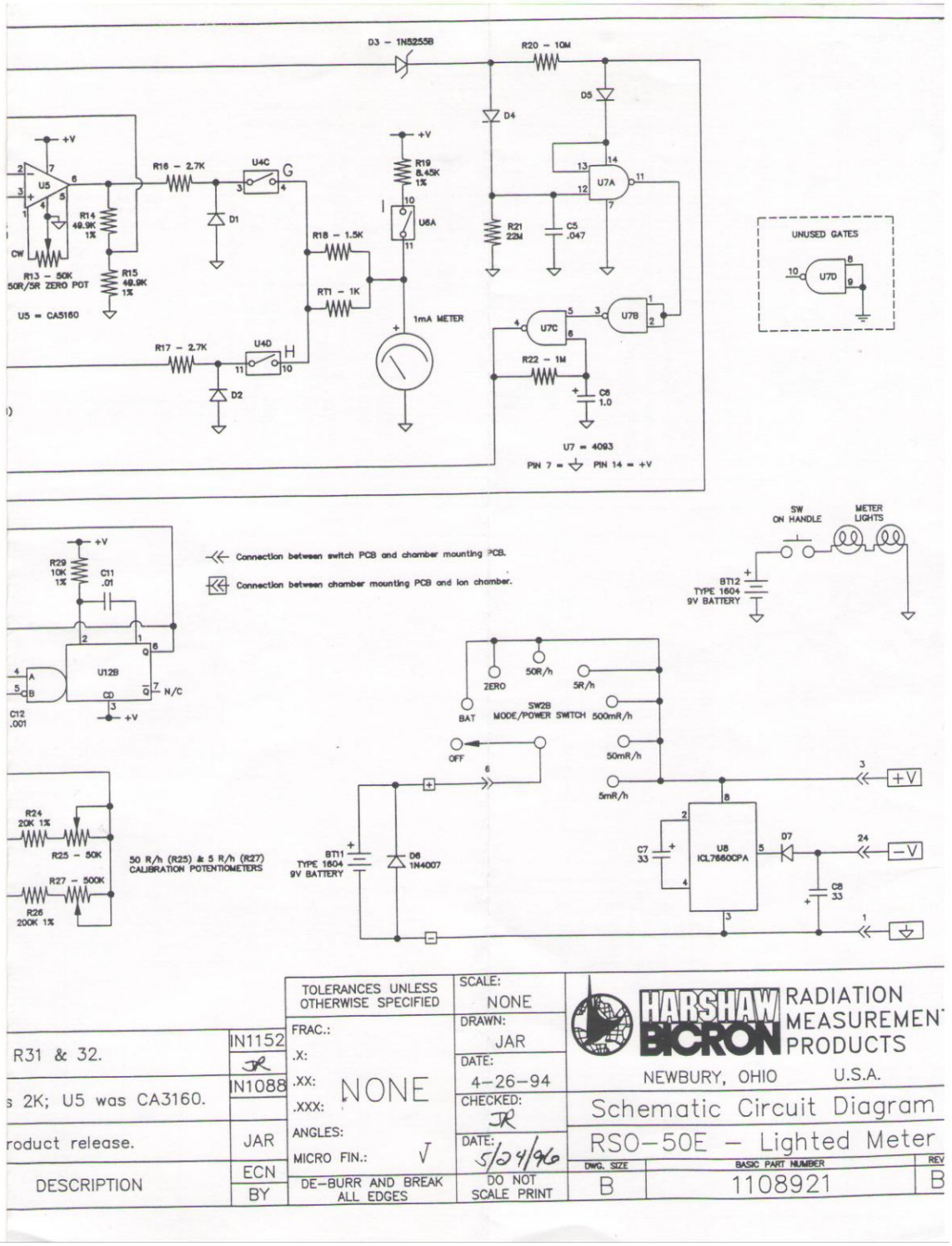
TOLERANCES UNLESS OTHERWISE SPECIFIED	SCALE: FULL
FRAC.: NONE .X: .XX: .XXX: ANGLES: MICRO FIN.: √	DRAWN: JAR DATE: 2-16-93 CHECKED: JR DATE: 5/24/96
DE-BURR AND BREAK ALL EDGES	DO NOT SCALE PRINT

HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS
NEWBURY, OHIO U.S.A.

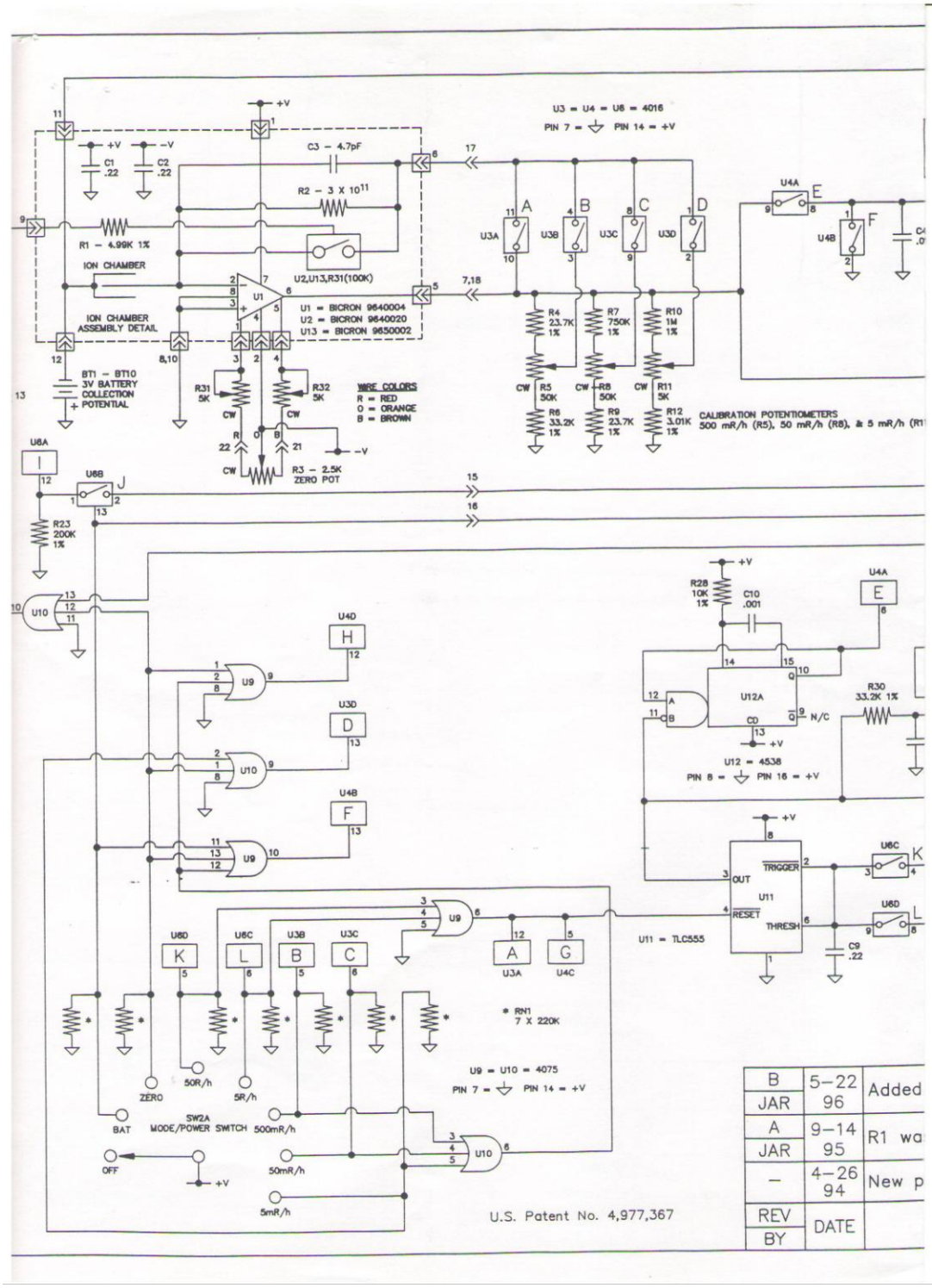
Part Location Drawing
Chamber Mtg Board Subass'y

DWG. SIZE	BASIC PART NUMBER	REV.
A	9700189	A

REV	DATE	DESCRIPTION	ECN
A	5-24 96	Update view to current rev.	IN1152
BY			BY
JAR			JR



		TOLERANCES UNLESS OTHERWISE SPECIFIED	SCALE: NONE	HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS
R31 & 32.	IN1152 JR	FRAC.:	DRAWN: JAR	NEWBURY, OHIO U.S.A.
s 2K; U5 was CA3160.	IN1088	.X: .XX: NONE .XXX:	DATE: 4-26-94	Schematic Circuit Diagram
roduct release.	JAR	ANGLES: MICRO FIN.: √	CHECKED: JR DATE: 5/24/96	RSO-50E – Lighted Meter
DESCRIPTION	ECN BY	DE-BURR AND BREAK ALL EDGES	DO NOT SCALE PRINT	DWG. SIZE: B; BASIC PART NUMBER: 1108921; REV: B



REV	DATE	
B JAR	5–22 96	Added
A JAR	9–14 95	R1 wa
–	4–26 94	New p